

ANTIMONY

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More than one-half of the primary antimony used in the United States during 2003 went into flame-retardants; most of the remainder was used by the ceramic, chemical, glass, and transportation industries. Secondary antimony, which was derived almost entirely from recycled lead-acid batteries, was used in the manufacture of new batteries. The average price of antimony was 22% higher than that of 2002.

There was no domestic antimony mine production during the year. Most primary antimony metal and oxide were produced domestically from raw material imports. Most domestic smelting consisted of upgrading imported antimony trioxide to a higher purity. Primary antimony metal and oxide were produced by two companies operating two plants—one in Montana and one in Texas. Secondary antimony was recovered from scrapped lead-acid batteries at secondary lead smelters. The amount of antimony used by battery manufacturers is substantially lower than it was 10 years earlier because of changing materials requirements for batteries. Industry stocks rose moderately (table 1).

Antimony was mined as a principal product or was a byproduct of the smelting of base-metal ores in 11 countries. World mine production declined, primarily owing to reduced mining activity in China, caused by investigations into a major mining disaster. Nearly all world primary antimony was mined in China (86%), South Africa (7%), Bolivia (3%), and Tajikistan (2%) (table 9).

Legislation and Government Programs

Sales of antimony by the Defense Logistics Agency (DLA) proceeded for the 11th consecutive year. Sales were conducted on a negotiated bid basis and were held bimonthly on the first Thursday of the month. There was no maximum limit to the quantity for which a company could submit a bid, but the minimum quantity was 18,144 kilograms (40,000 pounds).

The materials offered were grade A and grade B ingots, cake, and broken pieces. The antimony sulfide ore inventory has been depleted. In calendar year 2003, approximately 2,514 metric tons (t) of antimony was sold. The last amounts of antimony were awarded in July 2003, at which time the inventory was depleted. At calendar yearend 2003, the antimony inventory was zero.

Production

Mine Production.—There was no domestic mine production in 2003. The Nation's last sole domestic antimony producer, Sunshine Mining Co. in Idaho, closed its mine in early 2001.

For many years, the Sunshine Mine in Kellogg, ID, was the only domestic mine for antimony, where it was recovered as a byproduct of silver. The parent company (Sunshine Mining and Refining Co.) closed the mine and sold the refinery in 2001 after operating them at a loss for many years. Shortly thereafter, American Reclamation Inc. (ARI) purchased the mine, which had long been an important silver producer, with antimony as a byproduct. ARI filed for bankruptcy protection in May 2003 to forestall sale of the mine's assets by Shoshone County for property taxes of more than \$1 million that were in arrears. However, Sterling Mining Co. of Coeur d'Alene, ID, has agreed to lease the mine and has an option to buy it. The lease extends for 15 years with an annual payment of \$120,000 and an option to purchase the mine site for \$3 to \$5 million. It is unclear if there are any plans to resume antimony production (Platts Metals Week, 2003d).

Smelter.—The domestic producers of primary antimony metal and oxide products were Laurel Industries Inc., La Porte, TX, and U.S. Antimony Corp., Thompson Falls, MT. Both replied to the U.S. Geological Survey (USGS) request for production data.

Secondary.—Old scrap, mostly lead battery plates, was the predominant source of U.S. secondary antimony output. New scrap, mostly in the form of drosses and residues from various sources, supplied the remainder. Antimonial lead for the manufacture of new batteries was the main market for scrap antimony.

Consumption

In 2003, consumption of primary antimony (table 2) declined about 20% from that in 2002. Most categories of consumption registered moderate decreases compared with those of 2002 (table 3). Industry sources attributed the general decline to cyclical factors.

Lead-antimony alloys were used in ammunition, antifriction bearings, automotive vehicle batteries, cable sheaths, corrosion-resistant pumps and pipes, roof sheet solder, and tank lining. Antimony trioxide, often dissolved in an organic solvent, was used to enhance the flame-retardant properties of rubber and textiles as well as plastics and other combustibles. Antimony was also used as a decolorizing and refining agent in some forms of glass, such as optical glass.

Of the 119 companies to which a USGS consumption survey was sent, 66 firms responded. Consumption data were estimated for the remaining 53 firms. Actual consumption may be considerably higher than estimated and reported.

Prices

In 2003, antimony metal prices drifted downward during the course of the year, reaching a low of \$0.88 to \$1.04 per pound in late October before rebounding a bit to close the year at \$0.98 to \$1.07 per pound. However, the average antimony price for the year represented a 22% increase compared with that for 2002. American Metal Market ceased publishing the price for other forms of antimony, such as high-tint antimony trioxide, clean antimony sulfide concentrate, and lump antimony sulfide, in 2002. The average price increase in 2003 was attributed to a decline in antimony mine output.

Trade

U.S. imports of antimony were, as is usually the case, much larger than exports—about sevenfold larger in 2003 (tables 5-8). Imports of antimony declined by 7% from the levels of 2002, with the category of antimony ore and concentrate registering the greatest relative decline. China remained the largest provider of all three categories—antimony metal, ore and concentrate, and antimony oxide.

World Review

At a minor metals conference held in Genoa, Italy, the current world antimony supply-demand situation was discussed. Annual world demand for antimony metal was estimated to be about 110,000 t, and China accounts for about 80,000 t of the supply. Owing to floods and mine accidents in the past few years, sources of concentrate production in China have been lost. Thus, China has become a net importer of antimony concentrates—about 12,000 t in 2002. In 2003, China was projected to produce about 50,000 t of metal and 35,000 t of trioxide. However, much of the metal output will be diverted to trioxide production, causing a shortfall in primary metal exports (Metal-Pages, 2003e§¹).

Australia.—The Hillgrove gold and antimony mine east of Armidale, New South Wales (NSW), was reopened by its new owners. Early in 2002, the mine was placed in the hands of receivers as its owner, Malaysia Mining Corp., encountered mounting debt. New England Gold Proprietary Ltd., based in Newcastle, NSW, purchased the mine and is preparing for a resumption of production. The company is seeking permission from the NSW Government to build a new tailings facility at the mine. Antimony in NSW is derived solely from the antimony concentrates at Hillgrove. When the mine was operating, all of its production was exported with most probably going to China. In 2001, only 1,250 t of contained antimony was produced (Metal-Pages 2003g§).

Also in Australia, the antimony and gold exploration company A.G.D. Mining Ltd. announced results from its new Costerfield project in central Victoria. Geochemical sampling within and outside the mineralized corridor at Costerfield has outlined four additional exploration targets for antimony/gold mineralization. The new discovery would contribute to the project's existing resource base of 290,000 t, grading 12 grams of gold per metric ton and 6.2% antimony (Metal-Pages, 2002§).

Canada.—VVC Exploration Corp. (Toronto, Ontario) announced that it entered into an agreement with Roycefield Resources Ltd. to acquire all assets of the shuttered Beaver Brook antimony mine in Gander, Newfoundland, for \$13 million. According to VVC, the mine is expected to operate again in the first half of 2004. The mine has one of the world's largest undeveloped antimony deposits. In full production, the mine will probably supply about 5% of the world's annual antimony demand, and it would be the only operating antimony mine in North America. Neighboring U.S. markets were the world's largest consumers of antimony in 2003. The mine is located in central Newfoundland about 60 kilometers southwest of Gander. VVC indicates that the cost to rehabilitate the surface facilities will be about \$1.4 million, and that an extra \$1.3 million in underground development is required to restart production (Metal-Pages, 2003b§).

China.—China's General Administration of Customs announced it would monitor the import and export of antimony, manganese, tungsten, and zinc for a 6-month period at the ports of Changsha, Nanchang, Taiyuan, and Zhajiang. Information gained through monitoring will be used to identify trends and to provide an effective basis for the Government to make macroeconomic decisions (Metal-Pages, 2003c§).

The Government allocated only 67,000 t in its export quota for antimony—3,000 t less than the amount allocated in 2002 (Metal-Pages, 2003d§).

In 2002, Chinese firms exported a total of 20,300 t of refined antimony, a drop of 8% from that of 2001. Antimony oxide exports reached 49,500 t in 2002, a 37% increase above that of 2001.

During 2003, Chinese officials announced that they expected total refined antimony output for 2003 to be about 10% less than the previous estimate of 100,000 t, due to a lack of concentrate. China's antimony output during January-June 2003 was 61,000 t, down 14% from the same period of 2002. Only five of more than 60 antimony mines in Guangxi's Nandan area operated in 2003 (Platts Metals Week, 2003b).

In late 2003, Chinese officials indicated that antimony ingot and trioxide output in 2004 would decline. Government restrictions on mining have led to a tight supply of antimony concentrates available for processing to ingot and trioxide (Metal-Pages, 2004a§).

¹References that include a section mark (§) are found in the Internet References Cited section.

The Liuzhou Tin Group shut its two antimony plants in Guangxi's Hechi City in September due to a concentrate shortage. The two antimony plants, which have a combined capacity of 20,000 tons per year (t/yr) had planned to produce 12,000 t in 2003 (Platts Metals Week, 2003c).

The Yiyang Basan Antimony Product Works announced plans to reduce its antimony trioxide output to 1,500 t in 2003 from 2,500 t in 2002 owing to depleting resources. Officials complained that costs for exploitation were rising and that they preferred to lower output (Platts Metals Week, 2003a).

Nanxing Antimony Works, one of the largest antimony smelters in China's Guangxi Province, halted production owing to a lack of concentrates. Nanxing has a capacity of 20,000 t/yr, but was only producing about 350 t monthly. Nanxing also planned to produce antimony trioxide by building a new facility with a capacity of 8,000 t/yr (Metal-Pages, 2003h§).

Severe flooding in south-central China forced antimony producer Hsikwangshan Mining Administration to scale back production. Officials claimed that the company suffered interruptions to production at its southern Lengshuijiang mine as a result of prolonged heavy rainfall in Hunan Province. Nevertheless, the company, known for its Twinkling Star brand of antimony trioxide, remained optimistic that it would be able to achieve its production forecast of 25,000 t for 2003. Hsikwangshan's capacity is 37,000 t/yr (Metal Bulletin, 2003).

Xingquian Union Antimony Products temporarily halted antimony production because of a lack of raw material. Xingquian produced 1,000 t of antimony metal in 2002 (Platts Metals Week, 2003e).

Japan.—Sumitomo Metal Mining Co. agreed to sell its antimony trioxide flame retardant business to Nihon Seiko Co. The purchase will allow Nihon Seiko to increase its share of the 15,000-t Japanese antimony trioxide market (Metal-Pages, 2003i§).

Kyrgyzstan.—The Government announced a reduction in the antimony mineral resource tax from 5% to 2%, bringing it in line with that of other metallic ores. This reduction was seen as a boost for the struggling Kadamjai antimony smelter, which has been under financial pressure and had difficulty in sourcing antimony concentrates. Kadamjai normally gets its feed from Russia and Tajikistan. However, since the closure of several antimony mines in China, Chinese antimony smelters have been competing with Kadamjai to buy concentrates. The Kyrgyzstan Government indicated that it hopes the additional funds made available by the tax cut will be used to locate and develop new sources of antimony, as well as expand existing production (Mining Journal, 2003).

Officials announced that they expected a surge in antimony production in 2004, despite a decline in 2003. Kyrgyzstan production was 1,300 t in 2003, a decline of 13% from that in 2002. That decline was attributed to China's buying antimony ore from Kyrgyzstan's traditional suppliers—Kazakhstan, Russia, and Tajikistan. The country's state gold producer, Kyrgyzaltyn JSC, forecasts antimony production for 2004 to increase by 175% to 3,600 t. The Kadamjai Antimony Combine, Kyrgyzstan's principal antimony producer, which has a capacity of 20,000 t/yr of antimony, has identified new ore supplies in Russia and is improving its technology for processing lower grade local ores (Metal-Pages, 2004b§).

Mexico.—Great Lakes Chemical Corp. (Lafayette, IN) announced that it added a fifth antimony oxide production line at its Reynosa, Mexico facility. The plant's antimony trioxide product is combined with brominated flame retardants in polymer formulations widely used in electrical and electronics applications. It also has an effective flame retardant in high performance polyvinyl chloride applications. Great Lakes stated that it is the world's largest producer of flame retardants (Metal-Pages, 2003a§).

Peru.—Nonferrous metals miner Doe Run Peru announced that it intends to boost the output of its byproduct metals—antimony and bismuth—to compensate for a reduction in revenue from its primary metals (copper, lead, silver, and zinc). The company plans to produce 700 t of antimony in 2003, an increase of 122% from that of 2002; it aims to produce 840 t in 2004 (Metal-Pages, 2003f§).

Current Research and Technology

Antimony-base catalysts accounted for about 90% of the world market for catalysts used for producing bottle-grade polyethylene terephthalate (PET). In Japan, however, germanium has been the dominant base for such catalysts because they can endure sterilization. The limited global annual germanium production of less than 100 t has caused concern in Japan and has sparked one firm to develop an alternative. The Teijin Group reportedly is nearing completion of its development work on a titanium-base catalyst for PET production, which could be considered as a substitute for antimony-base catalysts (Metal-Pages, 2004c§).

Outlook

With the depletion of the DLA antimony inventory in 2003, a moderate-sized supply of antimony has been exhausted. Demand is likely to remain firm. Supply may encounter some additional declines before recovering.

References Cited

- Metal Bulletin, 2003, Floods disrupt antimony producer in southern China: Metal Bulletin, no. 8775, May 22, p. 11.
Mining Journal, 2003, Minor metals in July: Mining Journal, v. 341, no. 8748, August 8, p. 96.
Platts Metals Week, 2003a, Basan to cut antimony trioxide output: Platts Metals Week, v. 74, no. 3, January 20, p. 15.
Platts Metals Week, 2003b, Chinese antimony prices steady at \$2,200 - \$2,300 per mt: Platts Metals Week, v. 74, no. 36, September 8, p. 12.
Platts Metals Week, 2003c, Concs shortage shuts Liuzhou's Sb plants: Platts Metals Week, v. 74, no. 37, September 15, p. 14.
Platts Metals Week, 2003d, Sunshine silver mine files for bankruptcy: Platts Metals Week, v. 74, no. 22, June 2, p. 8.
Platts Metals Week, 2003e, Xingquian halts antimony output: Platts Metals Week, v. 74, no. 23, June 9, p. 5.

Internet References Cited

Metal-Pages, 2002 (December 31), AGD finds more gold and antimony, accessed February 1, 2003, via URL <http://www.metal-pages.com>.
Metal-Pages, 2003a (May 3), Antimony trioxide production boosted by 20% at Great Lakes, accessed May 21, 2003, via URL <http://www.metal-pages.com>.
Metal-Pages, 2003b (September 9), Bearer Brook antimony mine could be operating next year, accessed September 16, 2003, via URL <http://www.metal-pages.com>.
Metal-Pages, 2003c (July 3), China cites four cities to monitor imports and exports of Sb, Mn, Zn, and W, accessed July 2, 2003, via URL <http://www.metal-pages.com>.
Metal-Pages, 2003d (July 9), China exports only 5,000 tons Sb_2O_3 during January-May 2003, accessed July 10, 2003, via URL <http://www.metal-pages.com>.
Metal-Pages, 2003e (April 11), China to have a shortfall of 35,000 tons of antimony in 2003, accessed April 11, 2003, via URL <http://www.metal-pages.com>.
Metal-Pages, 2003f (August 8), Doe Run Peru to boost bismuth and antimony production, accessed September 16, 2003, via URL <http://www.metal-pages.com>.
Metal-Pages, 2003g (March 26), Hillgrove gold and antimony mine to re-open, accessed March 27, 2003, via URL <http://www.metal-pages.com>.
Metal-Pages, 2003h (April 9), Nanxing Antimony on brink of closure, accessed April 10, 2003, via URL <http://www.metal-pages.com>.
Metal-Pages, 2003i (June 12), Nihon Seiko buys SMM antimony trioxide business, accessed June 16, 2003, via URL <http://www.metal-pages.com>.
Metal-Pages, 2004a (January 30), Chinese antimony output expected to fall further, accessed February 2, 2004, via URL <http://www.metal-pages.com>.
Metal-Pages, 2004b (January 22), Sb surge seen in Kyrgyzstan, accessed January 23, 2004, via URL <http://www.metal-pages.com>.
Metal-Pages, 2004c (January 14), Ti could replace Ge for PET, accessed January 23, 2004, via URL <http://www.metal-pages.com>.

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Antimony. Ch. in United States Minerals Resources, Professional Paper 820, 1973.
Antimony. Mineral Industry Surveys, quarterly.

Other

Antimony. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.
Engineering and Mining Journal.

TABLE 1
SALIENT ANTIMONY STATISTICS¹

(Metric tons of antimony content unless otherwise specified)

| | 1999 | 2000 | 2001 | 2002 | 2003 |
|--|------------------|----------------------|----------------------|----------------------|---------------------|
| United States: | | | | | |
| Production: | | | | | |
| Primary: | | | | | |
| Mine (recoverable antimony) | 450 ² | W | -- | -- | -- |
| Smelter | 15,300 | 13,300 | 9,080 | W | W |
| Secondary | 8,220 | 7,700 | 5,380 | 5,350 | 5,600 |
| Exports of metal, alloys, waste and scrap (gross weight) | 473 | 1,080 | 1,730 | 992 | 771 |
| Exports of antimony oxide ³ | 3,190 | 6,040 | 5,880 | 3,260 | 2,910 |
| Imports for consumption | 36,800 | 41,600 | 37,900 | 28,500 | 26,700 |
| Reported industrial consumption, primary antimony | 13,500 | 16,400 | 13,100 | 11,500 ^r | 9,230 |
| Stocks, primary antimony, all classes, December 31 | 10,900 | 6,780 | 4,990 | 5,060 ^r | 6,370 |
| Price, average, cents per pound ⁴ | 62.7 | 65.5 | 64.7 | 88.4 | 107.5 |
| World, mine production | 107,000 | 126,000 ^r | 157,000 ^r | 113,000 ^r | 81,600 ^e |

^eEstimated. ^rRevised. W Withheld to avoid disclosing company proprietary data. -- Zero.

¹Data are rounded to no more than three significant digits, except prices.

²Data from 10-K reports.

³Antimony content is calculated by the U.S. Geological Survey.

⁴New York dealer price for 99.5% to 99.6% metal, c.i.f. U.S. ports.

TABLE 2
 REPORTED INDUSTRIAL CONSUMPTION OF
 PRIMARY ANTIMONY IN THE UNITED STATES¹

(Metric tons of antimony content)

| Year | Class of material consumed | | | Total |
|------|----------------------------|--------------------|--------------------|---------------------|
| | Metal | Oxide | Other ² | |
| 2002 | 1,780 | 9,660 ^r | 85 | 11,500 ^r |
| 2003 | 1,590 | 7,620 | 26 | 9,230 |

^rRevised.

¹Data are rounded to no more than three significant digits;
 may not add to totals shown.

²Includes residues and sulfide.

TABLE 3
REPORTED INDUSTRIAL CONSUMPTION OF PRIMARY
ANTIMONY IN THE UNITED STATES, BY PRODUCT¹

(Metric tons of antimony content)

| Product | 2002 | 2003 |
|----------------------------|---------------------|-------|
| Metal products: | | |
| Antimonial lead | 887 | 910 |
| Bearing metal and bearings | 42 | 43 |
| Solder | 89 | 85 |
| Other ² | 1,750 | 1,370 |
| Total | 2,760 | 2,410 |
| Nonmetal products: | | |
| Ammunition primers | W | W |
| Ceramics and glass | 505 | 487 |
| Pigments | 565 | 597 |
| Plastics | 837 ^r | 532 |
| Other ³ | 548 | 488 |
| Total | 2,460 ^r | 2,100 |
| Flame-retardants: | | |
| Adhesives | W | W |
| Plastics | 4,930 ^r | 3,680 |
| Rubber | 251 | 126 |
| Textiles | 269 | 150 |
| Other ⁴ | 861 ^r | 767 |
| Total | 6,310 ^r | 4,720 |
| Grand total | 11,500 ^r | 9,230 |

^rRevised. W Withheld to avoid disclosing company proprietary data.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes ammunition, cable covering, castings, sheet and pipe, and type metal.

³Includes fireworks and rubber products.

⁴Includes paper and pigments.

NOTE: Secondary antimonial lead was 5,350 metric tons (t) in 2002 and 5,600 t in 2003.

TABLE 4
INDUSTRY STOCKS OF PRIMARY ANTIMONY
IN THE UNITED STATES, DECEMBER 31¹

(Metric tons of antimony content)

| Type of material | 2002 | 2003 |
|--------------------|--------------------|-------|
| Metal | 729 | 587 |
| Oxide | 4,080 ^r | 3,580 |
| Other ² | 254 ^r | 2,200 |
| Total | 5,060 ^r | 6,370 |

^rRevised.

¹Data are rounded to no more than three significant digits;
may not add to totals shown.

²Includes ore and concentrate, residues, and sulfide.

TABLE 5
U.S. EXPORTS OF ANTIMONY METAL, ALLOYS, AND WASTE AND SCRAP,
BY COUNTRY¹

| Country | 2002 | | 2003 | |
|-------------|-------------------------------|----------------------|-------------------------------|----------------------|
| | Gross weight (metric tons) | Value (thousands) | Gross weight (metric tons) | Value (thousands) |
| Canada | 369 | \$842 | 305 | \$885 |
| Colombia | 5 | 9 | 1 | 3 |
| El Salvador | 29 | 55 | 10 | 28 |
| Germany | 70 | 692 | (2) | 79 |
| Japan | 2 | 17 | 2 | 11 |
| Mexico | 512 | 761 | 407 | 1,240 |
| Switzerland | 4 | 59 | 5 | 70 |
| Other | 1 | 68 | 42 | 696 |
| Total | 992 | 2,500 | 771 | 3,010 |

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 6
U.S. EXPORTS OF ANTIMONY OXIDE, BY COUNTRY¹

| Country | 2002 | | | 2003 | | |
|--------------------|-------------------------------|---|----------------------|-------------------------------|---|----------------------|
| | Gross weight (metric tons) | Antimony content ² (metric tons) | Value (thousands) | Gross weight (metric tons) | Antimony content ² (metric tons) | Value (thousands) |
| Argentina | 57 | 47 | \$269 | 126 | 105 | \$501 |
| Australia | 57 | 47 | 137 | 45 | 37 | 153 |
| Belgium | 51 | 42 | 99 | 137 | 114 | 503 |
| Brazil | 37 | 31 | 113 | 61 | 51 | 235 |
| Canada | 1,530 | 1,270 | 3,890 | 1,450 | 1,200 | 3,760 |
| China | 25 | 21 | 84 | 67 | 56 | 255 |
| Colombia | 58 | 48 | 133 | 29 | 24 | 94 |
| France | 66 | 55 | 199 | 33 | 27 | 105 |
| Germany | 23 | 19 | 43 | 78 | 65 | 487 |
| Indonesia | -- | -- | -- | 19 | 16 | 59 |
| Italy | 8 | 7 | 32 | 1 | 1 | 3 |
| Japan | 37 | 31 | 177 | 49 | 41 | 262 |
| Korea, Republic of | 11 | 9 | 56 | 41 | 34 | 158 |
| Mexico | 1,350 | 1,120 | 3,280 | 662 | 549 | 2,000 |
| Singapore | 33 | 27 | 313 | 20 | 17 | 152 |
| Spain | 49 | 41 | 242 | 24 | 20 | 132 |
| Taiwan | 15 | 12 | 61 | 14 | 12 | 37 |
| Turkey | 73 | 61 | 244 | 129 | 107 | 755 |
| United Kingdom | 170 | 141 | 716 | 206 | 171 | 861 |
| Other | 283 | 234 | 852 | 314 | 259 | 1,130 |
| Total | 3,930 | 3,260 | 10,900 | 3,500 | 2,910 | 11,600 |

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Antimony content is calculated by the U.S. Geological Survey.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF ANTIMONY, BY CLASS AND COUNTRY¹

| Country | 2002 | | | 2003 | | |
|--------------------------------------|-------------------------------|---|----------------------|-------------------------------|---|----------------------|
| | Gross weight (metric tons) | Antimony content ² (metric tons) | Value (thousands) | Gross weight (metric tons) | Antimony content ² (metric tons) | Value (thousands) |
| Antimony ore and concentrate: | | | | | | |
| Austria | 459 | 477 | \$1,700 | 36 | 34 | \$148 |
| Canada | -- | -- | -- | 1 | 1 | 4 |
| China | 723 | 715 | 1,000 | 352 | 350 | 747 |
| Germany | 38 | 26 | 104 | -- | -- | -- |
| Mexico | 42 | 37 | 105 | 39 | 28 | 109 |
| Yugoslavia | 57 | 56 | 144 | -- | -- | -- |
| Total | 1,320 | 1,310 | 3,050 | 428 | 412 | 1,010 |
| Antimony oxide: | | | | | | |
| Belgium | 3,680 | 3,060 | 6,660 | 2,590 | 2,150 | 5,910 |
| Brazil | -- | -- | -- | 3 | 2 | 19 |
| China | 10,200 | 8,430 | 18,700 | 9,560 | 7,940 | 22,800 |
| France | 12 | 10 | 50 | 21 | 18 | 36 |
| Germany | 22 | 19 | 272 | 36 | 30 | 358 |
| Hong Kong | 962 | 798 | 1,510 | 1,720 | 1,430 | 4,150 |
| India | -- | -- | -- | 10 | 8 | 32 |
| Italy | 4 | 3 | 17 | -- | -- | -- |
| Japan | 140 | 116 | 505 | 162 | 134 | 580 |
| Mexico | 9,770 | 8,110 | 15,500 | 8,720 | 7,240 | 15,100 |
| South Africa | 3,160 | 2,620 | 3,350 | 3,170 | 2,630 | 5,440 |
| Switzerland | -- | -- | -- | (3) | (3) | 3 |
| Taiwan | 18 | 15 | 33 | -- | -- | -- |
| United Kingdom | 18 | 15 | 45 | -- | -- | -- |
| Total | 27,900 | 23,200 | 46,700 | 26,000 | 21,600 | 54,400 |

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Antimony ore and concentrate content reported by the U.S. Census Bureau. Antimony oxide content is calculated by the U.S. Geological Survey.

³Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 8
U.S. IMPORTS FOR CONSUMPTION OF ANTIMONY METAL, BY COUNTRY¹

| Country | 2002 | | 2003 | |
|----------------|---------------------------|----------------------|---------------------------|----------------------|
| | Quantity (metric tons) | Value (thousands) | Quantity (metric tons) | Value (thousands) |
| Bolivia | 81 | \$160 | 14 | \$12 |
| Canada | 54 | 382 | 66 | 530 |
| China | 2,590 | 4,130 | 3,350 | 8,300 |
| Germany | (2) | 51 | 5 | 50 |
| Hong Kong | 92 | 164 | 21 | 50 |
| Japan | 3 | 139 | 1 | 92 |
| Mexico | 880 | 653 | 655 | 441 |
| Peru | 285 | 942 | 394 | 938 |
| United Kingdom | (2) | 143 | -- | -- |
| Other | 59 | 104 | 162 | 395 |
| Total | 4,050 | 6,870 | 4,670 | 10,800 |

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 9
ANTIMONY: WORLD MINE PRODUCTION, BY COUNTRY^{1,2}

(Metric tons)

| Country | 1999 | 2000 | 2001 | 2002 | 2003 ^e |
|--|---------|----------------------|----------------------|----------------------|-------------------|
| Australia ³ | 1,679 | 1,511 | 1,380 | 1,200 ^e | 1,300 |
| Bolivia | 2,790 | 1,907 | 2,264 | 2,336 ^r | 2,300 |
| Canada ⁴ | 357 | 433 ^r | 234 | 143 | 143 |
| China ^e | 89,600 | 110,000 | 140,000 ^r | 100,000 ^r | 70,000 |
| Kyrgyzstan ^e | 100 | 150 | 150 | 150 | 40 |
| Mexico ⁵ | 126 | 39 | -- | -- ^e | -- |
| Morocco ^{e, 4} | 250 | -- | -- | -- | -- |
| Peru, refined | 255 | 461 | 274 | 356 ^r | 356 |
| Russia, recoverable ^e | 4,000 | 4,500 | 4,500 | NA ⁶ | NA |
| South Africa ⁴ | 5,278 | 4,104 | 4,927 ^r | 5,746 ^r | 5,310 |
| Tajikistan ^e | 1,800 | 2,000 | 2,500 | 3,000 | 1,800 |
| Thailand, content of ore and concentrate | 59 | 84 | 40 ^r | 10 ^r | 40 |
| Turkey ^e | 180 | 360 | 370 | 370 | 350 |
| United States | 450 | W | -- | -- | -- |
| Total | 107,000 | 126,000 ^r | 157,000 ^r | 113,000 ^r | 81,600 |

^eEstimated. ^rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; not included in "Total." -- Zero.

¹World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Antimony content of ore unless otherwise indicated. Table includes data available through May 27, 2004.

³Antimony content of antimony ore and concentrate, lead concentrates, and lead-zinc concentrates.

⁴Antimony content of concentrate.

⁵Previously published data for Mexico included antimony mined in other countries and smelted in Mexico. That prior data were, in metric tons, as follows: 1999--273; 2000--52; 2001--81 (estimated); 2002--155 (revised); 2003--160.

⁶Reports indicate that Russian antimony production was sharply curtailed.